

**DEPARTMENT OF ENVIRONMENTAL QUALITY  
PERMITTING and COMPLIANCE DIVISION  
MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM  
(MPDES)**

**Fact Sheet/Statement of Basis**

Permittee:	Town of Joliet
Permit No.:	MT0020249
Receiving Water:	Rock Creek
Facility Information:	
Name	Joliet wastewater treatment facility
Location	East end of Joliet, T 4S, R 22 E, Sec. 13, Carbon County
Facility Contact:	Charles Buechler, Public Works Director P.O. Box 210 Joliet, MT 59041 (406) 962-3567
Fee Information:	
Number of Outfalls	1 (for fee purposes)
Outfall – Type	001- treated domestic wastewater

## I. Permit Status

This is a renewal of existing Montana Pollutant Discharge Elimination System (MPDES) permit MT0020249 for the Town of Joliet. The previous permit was effective December 1, 1997 and expired September 30, 2002. A complete renewal application was received by the Department of Environmental Quality (Department) on March 26, 2002. The application was complete and the permit was administratively extended, pursuant to the Administrative Rules of Montana (ARM) 17.30.1313.

## II. Facility Information

### A. Facility Description

The permittee operates a three cell aerated lagoon that was constructed in 1986. Effluent discharge is continuous and is not disinfected. The third cell is equipped with a multilevel draw-off structure. Design criteria are summarized in Table 1.

The effluent discharge rate is measured using a V-notch weir, accessed in the first manhole down gradient of the effluent control structure (Figure 1). Water quality samples are collected in another manhole, downgradient of the manhole where the discharge rate is measured. Samples are collected as water crests over a rectangular weir. A March 2007 compliance inspection found that approximately 1/3 of the total flow is leaking at the lower corners of the weir. The permittee stated the weir is scheduled for replacement in the Summer 2007.

Treated water leaves the property via a buried pipe. Approximately 1,000 feet downgradient of the wastewater treatment facility is a manhole where a second pipe of unspecified origin adds water to the effluent. The combined volume flows approximately 150 feet to an open man-made ditch. The ditch is approximately 300 feet and terminates in a side pool on the north side of Rock Creek.

Approximately 9,000 linear feet (of approximately 16,000 feet total) of collection main has been replaced since 1980. The last replacement effort was in 2005. The town uses one lift station located at the headworks of the facility. Two open-air screw pumps lift wastewater to the lagoons. The facility has a V-notch weir located at the top of the screw pumps to measure influent flow rates.

<b>Table 1: Current Design Criteria Summary</b>	
Facility Description: <b>Three-cell aerated lagoon, continuous discharge, no disinfection (source: O&amp;M manual, Sanderson/Stewart/Gaston Engineering, 1986)</b>	
Construction Date: 1986	Modification Date: none to date
Design Population: 934	Current Population: 575
Design Flow, Average (mgd): 0.170 winter 0.621 summer	Design Flow, Maximum Day (mgd): 0.821
Primary Cells: 1 (Normal series operation)	Secondary Cells: 2
Number Aerated Cells: 3	Minimum Detention Time-System (days): 34.7 at winter flow
Design BOD Removal (%): 85	Design BOD Load (lb/day): 187
Design SS Removal (%):	Design SS Load (lb/day): 168
Collection System Combined [ ] Separate [ X]	Estimated I/I: 35,506 gpd
SSO Events (Y/N): none reported	Bypass Events (Y/N): none reported
Disinfection (Y/N): None	Type: not applicable
Discharge Method: Continuous	
Sludge Storage: none	
Sludge Disposal: not applicable	EPA Sewage Sludge General Permit Authorization Number: not applicable

## B. Effluent Characteristics

Table 2 provides a summary of monthly self-monitoring data submitted by the permittee for the Period of Record (POR) January 2002 through May 2006.

The previous permit had a 30-day BOD<sub>5</sub> effluent limit of 45 mg/L. The permittee did not report any data for the POR that exceeded the limit.

In the previous permit, the 30-day limit was 100 mg/L for TSS. The TSS value reported for the July 2002 monitoring period was 110.2 mg/L; this was the only value for the POR that was greater than the 30-day limit. A written explanation from the permittee documenting conditions that could attribute to the TSS exceedance, or corrective actions taken, is not on file. The Department did not issue a violation letter citing the TSS exceedance.

Fecal coliform bacteria were analyzed monthly from April through October during the previous permit cycle. Ten reported fecal coliform results were greater than 200 colonies per 100-mL. The permittee did not report any data that exceeded the limit.

Table 2: DMR Effluent Characteristics<sup>(1)</sup> for POR January 2002 through May 2006

Parameter	Location	Units	Previous Permit Limit (7-d/30-d)	Minimum Value	Maximum Value	Average Value	Number of Samples
Flow, Daily Average	Effluent	mgd	NA <sup>(2)</sup>	0.030	0.165	0.068	60
Biochemical Oxygen Demand (BOD <sub>5</sub> )	Influent	mg/L	NA <sup>(3)</sup>	--	--	--	--
	Effluent	mg/L	45/30	<2	39.9	16.1	60
	Effluent	% removal	85 <sup>(3)</sup>	--	--	--	--
	Effluent	lb/day	NA <sup>(2)</sup>	0.62	63.9	8.9	60
Total Suspended Solids (TSS)	Influent	mg/L	NA <sup>(3)</sup>	--	--	--	--
	Effluent	mg/L	135/100	0.57	110	32.4	60
	Effluent	% removal	NA <sup>(3)</sup>	--	--	--	--
	Effluent	lb/day	NA <sup>(2)</sup>	0.14	134	19.4	60
Fecal Coliform Bacteria <sup>(5)</sup>	Effluent	Number per 100 mL	19,000/9,500	<1	1,600	82	35
pH	Effluent	s.u.	6.0 to 9.0 <sup>(4)</sup>	--	--	--	--
Temperature	Effluent	°C	NA <sup>(3)</sup>	--	--	--	--
Total Residual Chlorine	Effluent	mg/L	NA <sup>(3)</sup>	--	--	--	--
Total Ammonia as N, annual	Effluent	mg/L	NA <sup>(2)</sup>	0.07	12.3	3.3	60
Total Kjeldahl Nitrogen	Effluent	mg/L	NA <sup>(2)</sup>	0.7	17.3	7.4	60
Nitrate + Nitrite as N	Effluent	mg/L	NA <sup>(2)</sup>	0.102	3.291	0.788	60
Total Nitrogen <sup>(6)</sup>	Effluent	mg/L	NA <sup>(2)</sup>	0.806	18.428	8.17	60
		lb/day	NA <sup>(2)</sup>	0.02	11.93	4.22	60
Total Phosphorus as P	Effluent	mg/L	NA <sup>(2)</sup>	0.12	4.65	2.06	59
		lb/day	NA <sup>(2)</sup>	0.03	4.98	1.11	60
Dissolved Oxygen	Effluent	mg/L	NA <sup>(3)</sup>	--	--	--	--
Oil and Grease	Effluent	mg/L	NA <sup>(3)</sup>	--	--	--	--
Total Dissolved Solids	Effluent	mg/L	NA <sup>(3)</sup>	--	--	--	--

Footnotes: NA - Not applicable; ND - Non detect

1. Conventional and Non-conventional Pollutants only, table does not include information on toxic pollutants.
2. No effluent limit in previous permit, monitoring requirement only.
3. No limit or monitoring requirement in previous permit.
4. Effluent limit in previous permit, no monitoring required.
5. Sample period and effective limit is April 1 through October 31.
6. Calculated as the sum of TKN and Nitrite + Nitrate-N concentrations.

### C. Compliance History

The permittee has not received any violation notices from the Department for the POR.

Two MPDES compliance inspections have been completed during the POR. The first was on June 4, 2002. The inspector noted the leaking weir in the manway and recommended that the permittee perform an engineering review and implement a solution.

The second MPDES compliance inspection was March 13, 2007. Significant findings were: 1) two out of service aerators; 2) leaking effluent telescoping valve; 3) leaking effluent weir used for flow measurement; and 4) additional water from an unknown source that combines with effluent flow, downgradient of the last point of control. Spare parts on not kept on hand for out-of-service aerators. The replacement of the aerators is anticipated to occur before summer 2007. The permittee stated that the leaking telescoping valve and weir will be replaced during summer 2007. The water of unspecified origin that combines with wastewater downgradient of the lagoon does not appear to have a waste component, e.g. is clean groundwater. No odor, scum, solids, debris, or algae were noted in the manhole where the two flows combine. No water quality samples have been collected, to date, on the water of unspecified origin.

### III. Technology-Based Effluent Limits

The Montana Board of Environmental Review has adopted by reference 40 CFR 133 which set minimum treatment requirements for secondary treatment, or the equivalent, for publicly owned treatment works (POTW) (ARM 17.30.1209). Secondary treatment is defined in terms of effluent quality as measured by BOD<sub>5</sub>, TSS, percent removal of BOD<sub>5</sub> and TSS, and pH.

These requirements may be modified on a case-by-case basis for facilities that are eligible for treatment equivalent to secondary (TES) treatment (40 CFR 133.101(g)) or alternative state requirements (ASR) for TSS. To determine if a facility is eligible for TES the facility must meet the requirements of 40 CFR 133.101(g), summarized as follows:

1. The BOD<sub>5</sub> and TSS consistently achievable through proper operation and maintenance of the treatment works exceed the minimum effluent quality described for secondary treatment (40 CFR 122.102).
2. The treatment works utilize a trickling filter or waste stabilization pond, and
3. The treatment works utilizes biological treatment that consistently achieves a 30-day average of at least 65 percent removal (40 CFR 133.101(k)).

Water quality must not be adversely affected by the application of equivalent to secondary treatment. Effluent limits for BOD<sub>5</sub> cannot be relaxed unless the permittee has demonstrated that the relaxed limits will not result in a violation of water quality standards in the receiving water.

In addition to TES, permitting agencies may give special consideration to treatment works that employ waste stabilization ponds as the primary method for treating wastes. Alternative state requirements (ASR) may be incorporated into permits for lagoons if historic data for the system indicates that effluent limits based on TES cannot be achieved. The 30-day ASR for TSS in Montana is 100 mg/L [49 FR 37005; September 20, 1984]; the Department employed a 135mg/L TSS for a 7-day limit based on best professional judgment. ASR limits may be incorporated as seasonal limits. New facilities are not eligible for ASR.

The proposed Technology-based Effluent Limits (TBEL) satisfying the requirements of ARM 17.30.1209 are given in Table 3. The rationale for these limits are:

1. BOD<sub>5</sub> –National secondary standards. For the POR, the 95<sup>th</sup> percentile of the BOD<sub>5</sub> data is 30.0 mg/L. The permittee reported three effluent BOD<sub>5</sub> results as greater than 30 mg/L - 32.9 mg/L for May 2003, 32.6 mg/L for July 2004, and 39.9 mg/L for the April 2006 monitoring period. Four other monthly monitoring periods had BOD<sub>5</sub> reported at greater than 29 (e.g. 29.8 mg/L in April 2003, 29.3 mg/L in July 2003, 29.2 mg/L in March 2004, and 29.9 mg/L in June 2006).

The permit issued to the facility at the time of its construction (1986) stated that the facility would be expected to meet national secondary limits for BOD<sub>5</sub>. The aerated facility is equipped with multi-level draw-off to optimize effluent quality. The Operation and Maintenance (O&M) manual offers instructions and trouble shooting for attaining minimum effluent BOD<sub>5</sub>. A 2002 PER recommended that biosolids be removed from the first lagoon to maximize hydraulic treatment volume and detention time.

The TBEL in the previous permit for BOD<sub>5</sub> was TES.

2. TSS – TES; for the POR, the 95<sup>th</sup> percentile of TSS was 80.3 mg/L. Seasonal maxima were noted in the data, typically occurring March through June. However, other high values were noted erratically distributed through the data, such as an isolated month in mid-summer (July) and mid-autumn (October).

The facility discharge structure is designed to allow multi-level draw-off from a cell that is 11 feet deep. The MPDES permit effective at the time the facility was built required national secondary treatment requirements be met by the new facility. The permittee must show through proper operation and maintenance the level of treatment the facility can provide (40 CR 133). The slightly relaxed requirements, TES, are appropriate for the discharge from this facility because effects from spring turn-over could affect the TSS effluent quality, no matter the extent of proper O&M.

The TBEL in the previous permit for TSS was ASR.

ARM 17.30.1345 [40 CFR 122.45(f)(1)] requires that effluent limits must be expressed in terms of mass (mass/time), except for certain conditions, such as pH or temperature. For municipal treatment plants, mass-based limits are based on design flow (discussed in Part II) for the facility.

The winter design flow rate is used for mass-based limit calculation. Mass based limits are calculated as follows:

$$\text{Load (lbs/day)} = \text{Design Flow (MGD)} \times \text{Concentration (mg/L)} \times \text{Conversion Factor (8.34)}$$

BOD:

$$30\text{-d Load} = 0.170 \text{ MGD} \times 30 \text{ mg/L} \times 8.34 = 42.5 \text{ lb/day}$$

$$7\text{-d Load} = 0.170 \text{ MGD} \times 45 \text{ mg/L} \times 8.34 = 63.8 \text{ lb/day}$$

TSS:

$$30\text{-d Load} = 0.170 \text{ MGD} \times 45 \text{ mg/L} \times 8.34 = 63.8 \text{ lb/day}$$

$$7\text{-d Load} = 0.170 \text{ MGD} \times 65 \text{ mg/L} \times 8.34 = 92.2 \text{ lb/day}$$

Table 3: Technology Based Effluent Limits <sup>(1)</sup>				
Parameter	Units	Average Monthly Limit	Average Weekly Limit	Rationale
BOD <sub>5</sub>	mg/L	30	45	40 CFR 133.102 (a)
	lb/day	42.5	63.8	
	% removal	85 <sup>(2)</sup>	NA	
TSS	mg/L	45	65	40 CFR 133.105 (b)
	lb/day	63.8	92.5	
	% removal	65 <sup>(3)</sup>	NA	
pH	s.u.	6.0-9.0 (instantaneous)		40 CFR 133.102 (c)
<div>(1) See Definitions section at end of permit for explanation of terms.</div> <div>(2) The arithmetic mean of the values for BOD<sub>5</sub> for effluent samples collected in a period of 30 consecutive days shall not exceed 15% of the arithmetic mean of the values for influent samples collected at approximately the same time during the same period (85% removal).</div> <div>(3) The arithmetic mean of the values for TSS for effluent samples collected in a period of 30 consecutive days shall not exceed 35% of the arithmetic mean of the values for influent samples collected at approximately the same time during the same period (65% removal).</div>				

### Nondegradation Load Allocations

The provisions of ARM 17.30.701 - 718 (Nondegradation of Water Quality) apply to new or increased sources of pollution. ARM 17.30.702 defines “new or increased source” as an activity resulting in a change of existing water quality occurring on or after April 29, 1993. Outfall 001 is an existing source because it was in existence prior to that date. Sources that are in compliance with the conditions of their permit and do not exceed the limits established in the permit or determined from a permit previously issued by the Department are not considered new or increased sources.

The Department calculated nondegradation loads in the 1997 permit renewal for the current facility for BOD<sub>5</sub>, TSS, total nitrogen (TN) and total phosphorus as P (TP). For TSS, TN, and TP, the Department used an average of the winter and summer design flow, or 0.400 mgd. BOD<sub>5</sub> load allocation was calculated by applying 65% removal (Table 4).

The actual average loads discharged from the facility are presented in Table 4 and were obtained from self-monitoring data submitted by the permittee for the POR.

<b>Table 4. Outfall 001 Nondegradation and Actual Loads for POR</b>							
Nondegradation Allocated Load Limits			Actual 30-day Average Loads (lb/day)				
Parameter	Units	Annual Average Load	2002	2003	2004	2005	2006
BOD <sub>5</sub>	lb/day	65.5	12.3	12.0	8.6	5.2	6.4
TSS	lb/day	333.6	28.1	16.2	19.6	11.0	9.7
TN	lb/day	26.2	5.4	4.3	4.9	3.4	3.1
TP	lb/day	6.5	1.6	1.0	1.2	1.1	0.6

#### IV. Water-Quality Based Effluent Limits

##### A. Scope and Authority

Permits are required to include water quality based effluent limits (WQBEL) when technology based effluent limits are not adequate to protect state water quality standards (40 CFR 122.44 and ARM 17.30.1344). ARM 17.30.637(2) states that no wastes may be discharged that can reasonably be expected to violate any state water quality standards. Montana water quality standards (ARM 17.30.601-670) define both water use classifications for all state waters and numeric and narrative standards that protect those designated uses. New sources, as defined in ARM 17.30.703(16), are subject to Montana Nondegradation Policy (75-5-303, MCA) and regulations (ARM 17.30.701-718).

##### B. Receiving Water

Wastewater is discharged from the facility to Rock Creek. The receiving water is classified as B-1 according to Montana Water Use Classifications, ARM 17.30.611(1)(b)(iii). Waters classified B-1 are to be maintained suitable for drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply (ARM 17.30.623).

Rock Creek in the vicinity of the discharge is considered high quality water pursuant to Montana's Nondegradation Policy. Degradation of high quality water is not allowed unless authorized by the Department under 75-5-303(3), MCA.

Rock Creek is located within the Upper Yellowstone River Basin and in the USGS 4<sup>th</sup> Field Hydrological Unit Code (HUC) 10070006 – Clarks Fork of the Yellowstone. The Montana stream segment for Rock Creek at the point of discharge is MT43D002\_120, identified as the reach from the confluence of Red Lodge Creek to the Clarks Fork of the Yellowstone River. The receiving water in the vicinity of the discharge is listed on the 1996 and 2006 303(d) lists.



The 1996 303(d) list identified siltation, flow alteration, other habitat alterations, and suspended solids as causes of impairment to the cold-water fishery and aquatic life beneficial uses. Sources of impairment listed were agriculture, irrigated crop production, and range land. The 2006 303(d) list shows that the receiving water near the point of discharge partially supports aquatic life, cold-water fishery, and primary contact recreation beneficial uses caused by low flow alterations from water diversions and irrigated crop production. A TMDL (Total Maximum Daily Load) has not been prepared for the receiving water near the point of discharge.

The effluent ditch discharges to a side pool of Rock Creek. From the side pool, water trickle into a side channel of Rock Creek. The side channel meets the main channel of Rock Creek approximately 50-feet downstream of the effluent ditch point of discharge (based on visual estimation, March 2007 MDPES compliance inspection). The USGS does not maintain a gaging station located near the discharge.

The Montana Fish, Wildlife and Parks (FWP) electronic fisheries database states that the section where the permittee discharges is chronically dewatered. Fish identified as present include brook, brown, and rainbow trout, goldeye, longnose dace, mountain whitefish, and white and mountain suckers. All species are indicated as year-round residents (MFISH, 2007).

Receiving water quality data are limited. Table 5 summarizes those data retrieved from STORET, STOREASE, and the USGS databases, and MPDES compliance inspections

<b>Table 5: Ambient Water Quality Data</b>				
Parameter, units	Background Water Quality			
	Mean	Minimum	Maximum	Number data points
Flow, instantaneous, cfs	---	215	217	2
Temperature, winter, °F	---	46.2	48.2	2
Temperature, summer, °F	61.8	57.3	65.7	4
pH, winter, std. units <sup>(1)</sup>	--	7.1	9.1	2
pH, summer, std. units <sup>(1)</sup>	8.3	8.1	8.4	4
Dissolved Oxygen, mg/L	9.4	7.1	12.5	4
Specific Conductivity, µmhos	281	204	333	5
Ammonia, winter <sup>(1)</sup> , mg/L	<0.01	---	---	1
Ammonia, summer <sup>(1)</sup> , mg/L	---	0.01	0.02	2
Total Nitrogen, as N, mg/L	0.325	0.169	0.400	4
Total Phosphorus, mg/L	0.037	0.011	0.060	4
Chlorophyll <i>a</i>	---	22.9	30.7	2
(1) Winter is defined as November 1 through March 31; Summer is defined as April 1 through October 31.				

### C. Mixing Zone

A mixing zone is an area where the effluent mixes with the receiving water and certain water quality standards may be exceeded [ARM 17.30.502(6)]. The Department must determine the applicability of currently granted mixing zones [ARM 17.30.505(1)]. Mixing zones allowed under a permit issued prior to April 29, 1993 will remain in effect unless there is evidence that previously allowed mixing zones will impair existing or anticipated uses [ARM 17.30.505(1)(c)].

In accordance with ARM 17.30.517(1)(b), acute water quality standards for aquatic life may not be exceeded in any portion of the mixing zone unless the Department finds that allowing minimal initial dilution will not threaten or impair existing uses. The discharge must also comply with the general prohibitions of ARM 17.30.637(1) which require that state waters, including mixing zones, must be free from substances which will:

- a. settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines;
- b. create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials;
- c. produce odors, colors or other conditions as to which create a nuisance or render undesirable tastes to fish flesh or make fish inedible;
- d. create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; and
- e. create conditions which produce undesirable aquatic life.

Although certain standards may be exceeded in the mixing zone, an effluent in its mixing zone may not block passage of aquatic organisms nor may it cause acutely toxic conditions [ARM 17.30.602(16)]. No mixing zone will be granted that will impair beneficial uses [ARM 17.30.506(1)]. Aquatic life-chronic, aquatic life-acute and human health standards may not be exceeded outside of the mixing zone [ARM 17.30.507(1)(a)]. Acute standards may not be exceeded in any part of the mixing zone [ARM 17.30.507(1)(b)]. However, ARM 17.30.602(16) states that an effluent in its mixing zone, may not block passage of aquatic organisms nor may it cause acutely toxic conditions, except ammonia, chlorine, and dissolved oxygen may be present at concentrations so as to cause potentially toxic conditions in no more than 10% of the mixing zone provided that there is no lethality to aquatic organisms passing through the mixing zone.

A standard mixing zone may be granted for facilities which discharge less than 1 million gallons per day (MGD) or when mixing is nearly instantaneous [ARM 17.30.516(d)]. Nearly instantaneous mixing is assumed if the discharge is through an effluent diffuser, when the mean daily flow exceeds the 7-day, 10-year low flow (dilution ratio <1) or the permittee demonstrates through a Department approved study plan that the discharge is nearly instantaneous. A nearly instantaneous mixing zone may not extend downstream more than two (2) river widths.

Effluent discharges which do not qualify for a standard mixing zone must apply for a source specific mixing zone in accordance with ARM 17.30.518 and must conform to the requirements of 75-5-301(4), MCA which states that mixing zones must be the smallest practicable size; have minimal effects on uses; and, have definable boundaries. ARM 17.30.515(2) states that a person applying for a mixing zone must indicate the type of mixing

zone and provide sufficient detail for the Department to make a determination regarding the authorization of the mixing zone under the rules of Subchapter 5.

The Department granted a mixing zone in the previous permit for fecal coliform bacteria based on Best Professional Judgment (BPJ). The mixing zone extended approximately 1-mile downstream. Complete mixing was assumed to occur at the full 7Q10 of Rock Creek. The Department is not granting a mixing zone for pathogens. At this time, no permit limits require a mixing zone. Future limits, particularly for total ammonia, may require a more comprehensive mixing zone analysis.

The permittee may apply for a mixing zone. ARM 17.30.515(2) states that a person applying for a mixing zone must indicate the type of mixing zone requested and supply sufficient detail for the Department to make a determination regarding the authorization of the mixing zone.

A long-term USGS gaging station does not exist on Rock Creek. The previous permit attempted to quantify the 7-day 10-year low flow (7Q10) by addition of 7Q10 data from upstream stations. The 7Q10 documented in the last statement of basis was 28.2 cubic feet per second.

#### D. Applicable Water Quality Standards

Discharges to surface waters classified B-1 are subject to the specific water quality standards of ARM 17.30.623 (March 31, 2006), Department Circular DEQ-7 (February 2006), as well as the general provision of ARM 17.30.635 through 637, 641, 645, and 646. In addition to these standards, dischargers are also subject to ARM 17.30 Subchapter 5 (Mixing Zones, November 2004) and Subchapter 7 (Nondegradation of Water Quality, June 30, 2004).

ARM 17.30.635(4) requires that the design condition for disposal systems must be based on the 7-day average flow of the receiving water which is expected to occur on average once in 10-years (7Q10). More restrictive requirements may be necessary due to specific mixing zone requirements.

Pollutants typically present in domestic lagoon effluent that could exceed water quality standards include *Escherichia coli* (*E. coli*) bacteria, total ammonia, nutrients, low levels of dissolved oxygen (DO), and total residual chlorine when used to control pathogens.

***Escherichia coli*** - Montana water quality standards were revised to replace fecal coliform bacteria with *Escherichia coli* (*E. coli*) bacteria to reflect the latest federal guidance. Applicable standards for *E. coli* are:

- April 1 through October 31 of each year - the geometric mean number of *E. coli* must not exceed 126 colony forming units (cfu) per 100 milliliters (ml) and 10% of the total samples may not exceed 252 cfu per 100 ml during any 30-day period [ARM 17.30.625(2)(a)(i)]; and
- November 1 through March 31 of each year - the geometric mean number of *E. coli* must not exceed 630 cfu per 100 ml and 10% of the total samples may not exceed 1,260 cfu per 100 ml during any 30-day period [ARM 17.30.625(2)(a)(ii)].

**Total Ammonia as N** - Standards for total ammonia are pH and temperature dependent. Standard calculations are outlined in the Department Circular, DEQ-7 (February 2006). Total ammonia standards are further defined as acute one-hour average (CMC) and chronic 30-day average (CCC) criterion. The fishery present and associated life stages are also taken into consideration for ammonia standard calculations.

Water quality standards for total ammonia as N were estimated using the data in Table 5. These data are summarized in Table 6.

<b>Table 6: Ammonia standard calculations (DEQ, 2006).</b>						
Condition	Period <sup>(1)</sup>	Salmonids Present	Early Life Stages Present	Ambient Condition		Water Quality Standard <sup>(4)</sup>
				pH	Temperature °C	
Acute	Annual	Yes	NA	8.9 <sup>(2)</sup>	NA	1.04
Chronic	Winter	NA	Yes	8.1 <sup>(3)</sup>	8.5 <sup>(3)</sup>	2.10
Chronic	Summer	NA	Yes	8.4 <sup>(3)</sup>	16.7 <sup>(3)</sup>	1.12
NA – Not Applicable Footnotes: (1) Winter is defined as November 1 through March 31 and summer as April 1 through October 31. (2) Based on 95 <sup>th</sup> percentile of annual data. (3) Based on mean of values in the applicable period. (4) Based on Department Circular DEQ7 (February 2006)						

**Dissolved Oxygen (DO)** – Freshwater aquatic life standards are characterized by the fishery (cold- or warm-water) and by the presence or absence of fish early life stages. Standards are further defined based on a time frame and required DO levels. B-1 waterbody classification states the receiving waters are cold-water fisheries. DO standards for B-1 waters are given in Table 7.

<b>Table 7: B-1 Water Classification DO Standards</b>				
Dissolved Oxygen (mg/L)	30-Day Mean	7-Day Mean	7-Day Mean Minimum <sup>(3)</sup>	1-Day Minimum <sup>(3)</sup>
Early Life Stages <sup>(1, 2)</sup>	N/A	9.5	N/A	8.0
Other Life Stages	6.5	N/A	5.0	4.0
Footnotes: N/A – “not applicable” (1) These are water column concentrations recommended to achieve the required inter-gravel dissolved oxygen concentrations shown in parentheses. For species that have early life stages exposed directly to the water column, the figures in parentheses apply. (2) Includes all embryonic and larval stages and all juvenile forms of fish to 30-days following hatching. (3) All minima should be considered as instantaneous concentrations to be achieved at all times.				

#### E. Proposed Water Quality-Based Effluent Limits (WQBEL)

Parameters typically present in municipal wastewater that may cause or contribute to a violation of water quality standards include the conventional pollutants such as biological material (as measured by BOD<sub>5</sub>), suspended solids, oil & grease, pathogenic bacteria, and pH; the non-conventional pollutants such as total residual chlorine, total ammonia, total nitrogen, and total phosphorus; and the carcinogenic and toxic pollutants such as volatile organic carbon substances and metals which can include, but is not limited to, arsenic, cadmium, chromium, copper, cyanide, lead, mercury, molybdenum, nickel, selenium, silver, and zinc.

ARM 17.30.1345 requires WQBELs to be developed for any pollutant for which there is reasonable potential (RP) for discharges to cause or contribute to exceedances of instream numeric or narrative water quality standards. RP calculations utilize the receiving water concentration, the maximum projected effluent concentration, the design flow of the wastewater treatment facility, and the applicable receiving water flow.

***Escherichia coli*** – The Department is not granting a mixing zone for *E. coli* bacteria based on the following considerations: 1) potential incomplete mixing of the effluent in the receiving water due to the isolated side pool of Rock Creek; 2) the potential for public recreation [ARM 17.30.506(2)(b), recreational area, means public beach or swimming area, and adjacent streams or lakes]; and, 3) ARM 17.30.637(1)(e) which requires that state waters must be free from substances that are harmful or toxic to humans.

Effluent data for fecal coliform bacteria show RP to exceed current *E. coli* bacteria standards. *E. coli* bacteria are a subset of fecal coliform bacteria and the correlation is approximately linear. *E. coli* bacteria are measured and reported as cfu (colony forming units). The previous permit limited fecal coliform during the summer (April 1 – October 31) when the water temperature is greater than 60°F. The summer 30-day standard for fecal coliform (200 cfu/100-mL) is equivalent to 126 cfu/100-mL for the 30-day *E. coli* standard. The 7-day standard for fecal coliform (400 cfu/100-mL) is equivalent to the daily maximum of 252 cfu/100-mL. The previous fecal coliform bacteria limits, applicable during the summer only, were 19,000 organisms/100-mL and 9,500 organism/100-mL for 7-day and 30-day average, respectively. (The previous permit used “organisms” as the unit of measure for bacteria)

The permittee will be required to meet the *E. coli* bacteria standards at the end of treatment by April 1, 2011. For the interim, the previous permit limits will be used, translated using the linear relationship to *E. coli* as follows:

$[E. coli \text{ 30-day standard} * \text{previous fecal coliform limit}] / \text{former 30-day fecal coliform standard}$

30-day interim *E. coli* limit:

$[126 \text{ cfu/100-mL} * 9,500 \text{ organisms/100-mL}] / 200 \text{ organisms/100-mL} = \mathbf{5,989 \text{ cfu/100-mL}}$

Maximum daily interim *E. coli* limit:

$[252 \text{ cfu/100-mL} * 19,000 \text{ organisms/100-mL}] / 400 \text{ organisms/100-mL} = \mathbf{11,970 \text{ cfu/100-mL}}$

**Total Ammonia as N** – No effluent limits are calculated for total ammonia as N because receiving water data are insufficient for effluent derivation. Receiving water data are sparse (six data points spanning 25 years, Table 5) and more will need to be collected during this permit cycle.

The dilution effect fresh or unaltered water on the effluent is unknown. Prior to day lighting, the wastewater effluent mixes in the discharge pipe with another unknown source of water, potentially adding a dilution component. Effluent is discharged into a pool that does not offer much, if any, mixing water flow (based on March 2007 compliance inspection observations). The permittee will monitor the receiving water, in the thalweg of the side channel, to better define ambient conditions for ammonia standard calculations. Monitoring the effects of the dilution by the additional water added in the effluent pipe will be required.

**Whole Effluent Toxicity (WET) Testing Requirements** – ARM 17.30.637(1)(d) requires that state water be free from substances attributable to municipal waste that create conditions that are harmful or toxic to human, animal, plant or aquatic life, except the Department may allow limited toxicity in a mixing zone provided certain conditions are met (Part IV. D).

An assessment of toxicity in the effluent has not been performed at this facility. The permittee will be required to monitor potential toxicity in the effluent by means of WET testing [ARM 17.30.1322(6)(j)]. During calendar year 2010 (the third year of the permit cycle), WET testing of the effluent at Outfall 001 shall be conducted quarterly on two species during as described in the permit. The Department follows the EPA Region VIII toxicity policy (EPA, August 1997).

## V. Final Effluent Limits

Effective upon issuance through March 31, 2011, the quality of the effluent shall meet the following limits.

<b>Interim Effluent Limitations: Outfall 001</b>				
Parameter	Units	Average Monthly Limit <sup>(1)</sup>	Average Weekly Limit <sup>(1)</sup>	Maximum Daily Limit <sup>(1)</sup>
Biological Oxygen Demand (BOD <sub>5</sub> )	mg/L	30	45	--
	lbs/day	42.5	63.8	--
Total Suspended Solids (TSS)	mg/L	45	65	--
	lbs/day	63.8	92.2	--
<i>E. coli</i> bacteria <sup>(2), (3)</sup>	cfu/100ml	5,985	--	11,970
Footnotes: (1) See Definition section at end of permit for explanation of terms. (2) This limitation applies from April 1 through October 31. (3) Report Geometric Mean if more than one sample is collected in the reporting period.				

Effective April 1, 2011 and effective through the duration of the permit, the effluent quality shall meet the following limits.

<b>Final Effluent Limitations: Outfall 001</b>				
Parameter	Units	Average Monthly Limit <sup>1</sup>	Average Weekly Limit <sup>1</sup>	Maximum Daily Limit <sup>1</sup>
Biological Oxygen Demand (BOD <sub>5</sub> )	mg/L	30	45	--
	lbs/day	42.5	63.8	
Total Suspended Solids (TSS)	mg/L	45	65	--
	lbs/day	63.8	92.2	
<i>E. coli</i> bacteria <sup>2, 4</sup>	cfu/100ml	126	--	252
<i>E. coli</i> bacteria <sup>3, 4</sup>	cfu/100ml	630	--	1,260
Total Residual Chlorine (TRC)	mg/L	0.011	--	0.019
Footnotes: 1. See Definition section at end of permit for explanation of terms. 2. This limitation applies from April 1 through October 31. 3. This limitation applies from November 1 through March 31. 4. Report Geometric Mean if more than one sample is collected in the reporting period.				

## VI. Monitoring Requirements

### A. Influent/Effluent Monitoring

Monitoring Requirements				
Parameter	Unit	Sample Location	Sample Frequency	Sample Type <sup>1</sup>
Flow	mgd	Influent	1/Week	Instantaneous
	mgd	Effluent	1/Week	Instantaneous
5-Day Biological Oxygen Demand (BOD <sub>5</sub> )	mg/L	Influent	1/Month	Composite
	mg/L	Effluent	1/Week	Grab
	% Removal <sup>2</sup>	Effluent	1/Month	Calculated
	lb/day	Effluent	1/Month	Calculated
Total Suspended Solids (TSS)	mg/L	Influent	1/Month	Composite
	mg/L	Effluent	1/Week	Grab
	% Removal <sup>2</sup>	Effluent	1/Month	Calculated
	lb/day	Effluent	1/Month	Calculated
pH	s.u.	Effluent	1/Week	Instantaneous
Temperature	°C	Effluent	1/Week	Instantaneous
<i>E. coli</i> Bacteria <sup>3</sup>	cfu/100ml	Effluent	1/Month	Grab
Total Residual Chlorine <sup>4</sup>	mg/L	Effluent	Daily	Grab
Oil and Grease <sup>5</sup>	mg/L	Effluent	1/Quarter	Grab
Total Ammonia, as N	mg/L	Effluent	1/Month	Grab
Total Nitrate + Nitrite, as N	mg/L	Effluent	1/Quarter	Grab
Total Kjeldahl Nitrogen	mg/L	Effluent	1/Quarter	Grab
Total Nitrogen, as N <sup>6</sup>	mg/L	Effluent	1/Quarter	Calculated
	lb/day	Effluent	1/Quarter	Calculated
Total Phosphorus, as P	mg/L	Effluent	1/Quarter	Grab
	lb/day	Effluent	1/Quarter	Calculated
Total Dissolved Solids (TDS)	mg/L	Effluent	1/Quarter	Grab
Dissolved Oxygen	mg/L	Effluent	1/Quarter	Grab
Whole Effluent Toxicity, Acute <sup>7</sup>	% Effluent	Effluent	1/Quarter	Grab
Footnotes: 1. See Definition section at end of permit for explanation of terms. 2. See narrative discussion in this section of permit for additional details. 3. From permit issuance through October 31, 2010, monitoring is required during the summer period. Beginning April 1, 2011, monthly <i>E. coli</i> bacteria monitoring is required year round. 4. The Permittee is only required to sample for total residual chlorine if chlorine is used as a disinfectant in the treatment process. If chlorine is <i>not</i> used, write "NA" on the DMR for this parameter. 5. Use EPA Method 1664, Revision A: N-Hexane Extractable Material (HEM), or equivalent. 6. Calculated as the sum of Nitrate + Nitrite (as N) and Total Kjeldahl Nitrogen (as N) concentrations. 7. Required during each quarter of the third full calendar year, 2010, of the permit cycle.				



## B. Instream Monitoring

**Ambient monitoring** – Effective upon issuance, the permit will require that the permittee collect quarterly pH and water temperature from Rock Creek, 100 yards upstream of the point of discharge and in the flowing water, for determination of ammonia standards.

Effective upon permit issuance for future permit total ammonia limit calculations, the permit will require the permittee to collect quarterly total ammonia grab samples from Rock Creek at the same instream location (100 yards upstream of the point of discharge and in the flowing water of Rock Creek).

**Effluent ditch, Point of Discharge** – The permit will require the permittee to collect quarterly pH, temperature, and total ammonia samples from the effluent ditch, five feet upstream of the final point where it discharges into Rock Creek.

Ambient Monitoring Requirements			
Location	Parameter	Unit	Sample Frequency
Rock Creek, 100 yards upstream of discharge	Total Ammonia as N	mg/L	1/Quarter
	pH	s.u.	1/Quarter
	Water Temperature	°C	1/Quarter
Effluent ditch at point of discharge	Total Ammonia as N	mg/L	1/Quarter
	pH	s.u.	1/Quarter
	Water Temperature	°C	1/Quarter

## VII. Other Information

On September 21, 2000, a US District Judge issued an order stating that until all necessary total maximum daily loads (TMDLs) under Section 303(d) of the Clean Water Act are established for a particular water quality limited segment, the State is not to issue any new permits or increase permitted discharges under the MPDES program. The order was issued under the lawsuit Friends of the Wild Swan vs. US EPA et al, CV 97-35-M-DWM, District of Montana, Missoula Division.

The renewal of this permit does not conflict with Judge Molloy's order because the permitted discharge does not represent a new or increased source of pollutants under the MPDES program.

## VIII. Information Source

40 CFR, Parts 122, 136, July 1, 2000.

DEQ. Circular WQB-7, Montana Numeric Water Quality Standards. February 2006.

DEQ. ARM (Administrative Rules of Montana) 17.30.601-670. Montana Surface Water Quality Standards. February 2006.

DEQ. ARM 17.30.701-717. Nondegradation of Water Quality. June 1996.

DEQ. ARM 17.30.1201-1209, 17.30.1301-1387. Montana Pollutant Discharge Elimination System (MPDES). March 2003.

DEQ. 2006 Montana Integrated Water Quality Report. 2006.

EPA. Office of Water. Design Manual for Municipal Wastewater Stabilization Ponds, EPA 625-1-83-015. October 1983.

EPA. Technical Support Document for Water Quality-Based Toxics Control (TSD), EPA/505/2-30-001. March 1991.

MCA (Montana Code Annotated), Title 75-5-101 *et seq.*, "Montana Water Quality Act". 2003.

MFISH – Montana Fish, Wildlife and Parks electronic fisheries database. Accessed on the web at: <http://maps2.nris.mt.gov/scripts/esrimap.dll?name=MFISH&Cmd=INST>. Accessed: March 21, 2007.

Sanderson/Stewart/Gaston Engineering, Inc. Operation and Maintenance Instructions for Wastewater Treatment and Disposal System, Town of Joliet, Montana. Revised April 1986.

Prepared by: Rebecca Ridenour  
Date: May 14, 2007

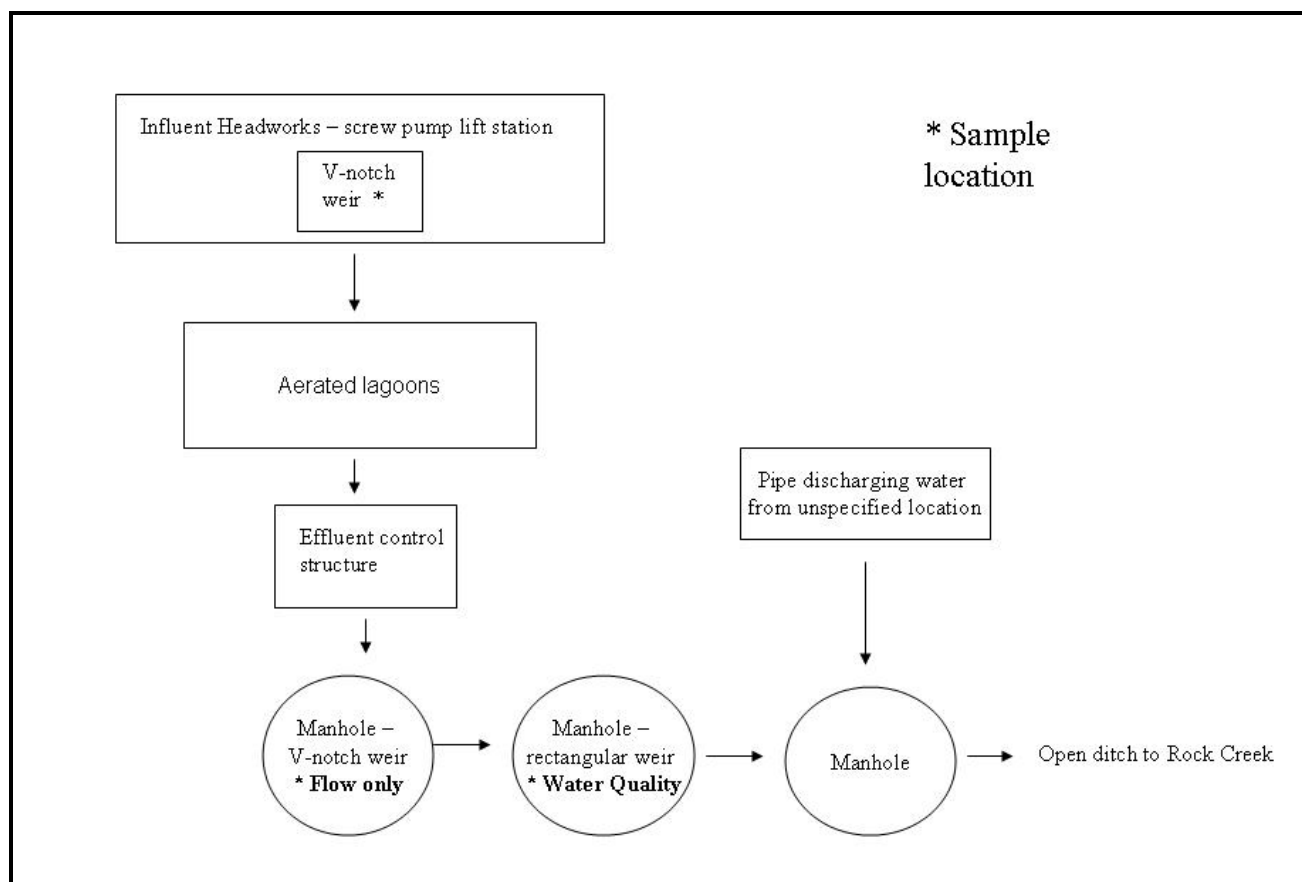


Figure 1 – Facility flow diagram